Energy-efficiency and renewable energy financial incentives: public perception in Malta – top-down, or bottom-up approach?

Considering the high energy bill paid by developed countries when it comes to energy, especially that related with the built environment, it is not surprising that improving energy-efficiency in buildings is high on both the national and international political agenda. Unfortunately improving the energy-efficiency of buildings through applications such as installing double glazing or roof insulation or renewable energy devices such as solar water heaters or photovoltaic panels comes at a premium.

This partially hinders their competitiveness and eventual market penetration. To address this issue most countries have developed a number of incentives, typically fiscal ones, specifically targeted at helping such applications or devices to become competitive and increase their presence on the respective national market. Malta like other EU member states has adopted its own measures to incentivize such a market. In this context, this paper focuses on what type of incentives has the local market (both government and privately driven) used to improve the situation and increase the market presence of such applications and device. Indications are that although the start-up has been slow, these financial incentives have created a thriving market which is however essentially dependent on such incentives. Similarly it shows that in the case of Malta, a bottom-up approach has stimulated an educated shift towards smarter energy use.

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Introduction

Energy consumption in the built environment in the EU accounts for around 40 % (Enerdata, 2012) of the total energy consumption. Buoyed by the ever-increasing search for thermal comfort in indoor spaces, this figure is bound to increase or at best remain stable for the foreseeable future. This of course is putting a lot of pressure for countries to develop their own strategies so as to address this demand, possibly decreasing within a sustainable threshold. Energy-efficiency applications such as installing double glazing or roof insulation in buildings or renewable energy devices such as solar water heaters or photovoltaic panels come at a premium in the form of a possibly hefty capital expenditure or a long payback period which are far from being attractive.

Some countries opt to have the use of some of these applications and systems mandated by law, as indeed few individuals or companies will enter such an expense voluntarily. Such a method typically relies on obligatory requirements for permitting new buildings or refurbishing existing ones. The requirement of having a solar water heater installed on every new building in Cyprus (Korniotis et al., 1999) or the enforcement of regulations for the minimum energy performance of new and refurbished buildings in EU countries as established in Directive 2010/31/EU (European Parliament, 2010) are examples of such mandatory regulations.

Most countries however, prefer a softer approach where incentives, predominantly of the financial form, are given to promote energy-efficient technologies. The effectiveness of a bottom-up or a top-down implementation has therefore been tested. It is clear that public perception and attitudes are all about a ‘carrot or stick’ approach.

Background and scope behind financial incentives

Financial incentives are special purpose made mechanisms, which countries through their central or regional authorities, may decide to use in order to assist and promote selected technologies, typically environmentally friendly or energy-efficient ones. In most cases such financial incentives are required in order to overcome the initial capital investment cost, which is often higher than that of conventional systems.

Financial incentives typically take the form of either upfront capital grants, offsetting part of the higher capital cost incurred through the purchase of such systems, or else Feed-in Tariffs payable on any exported energy. The former is particularly common where the system does not involve the production of energy and is typically reserved for energy-savings measures such as improving the building envelope through measures such as installing double glazing or roof insulation, etc. The latter is more common where energy is produced and exported to the grid such as in the case of electricity produced from photovoltaic panels, combined heat and power systems and wind energy.

Malta’s experience at using financial incentives – an overview

Up to ten years ago, the market for renewable energy or energy-efficient measures in Malta was a practically insignificant part of the local energy scene. The prices of these applications and systems were considered to be exorbitant and their payback period (considering the cost of alternative conventional systems – electricity and fossil fuel) deemed unreasonable, even when considering the lower operational costs involved.

Come Malta’s accession into the European Union and the ratification of international agreements and obligations, not only related directly to the European Union such as the Renewable Energy Directive (European Parliament, 2001) and the Energy Performance of Buildings Directive (European Parliament, 2002), but also to international agreements such as the Kyoto Protocol, etc., governments started to develop the first incentives aimed at increasing the uptake of such systems and applications.

What follows is a summary of what has been done in Malta at public level through government driven incentives and privately, mainly through specialised bank loans.

Government driven financial incentives aimed at the residential sector

The first schemes aimed specifically at increasing the uptake of solar water heaters took the shape of soft grants covering part (generally up to 15 – 20 %) of the capital cost of such systems. Concurrently the local electricity supplier, Enemalta, offered to waive off the electricity connection fee to any household which had installed a solar water heater prior to applying for its energy meter. Pick up for the scheme was slow and the number of systems installed totalled only in the few 100s (MRRA, 2011).

Given the non-encouraging results obtained from this first scheme a more aggressive campaign was initiated. This time round the scheme was specifically intended at increasing the energy-efficiency at end-use. In this context, and as part of its plan to promote a higher appreciation of energy-efficiency in residential buildings, in 2007 the Maltese Government launched a once-only grant payment for the purchase of energy-efficient appliances (MEH, 2014a). The scheme involved the payment of a grant on the purchase price (up to 20 % of the total cost with a maximum capping) of energy-efficient washing machines, fridge freezers, tumble dryers, air conditioners and dishwashers as shown in Table 1 (MEH, 2014b).

This scheme was followed in 2009 by a scheme for the replacement of incandescent light bulbs with Compact Fluorescent Lamps (CFLs). The scheme did not revolve any specific fiscal incentive but rather the Maltese Government announced that through the local Energy Authority, the Malta Resources Authority, it would make available a number of energy saving lamps free of charge to every household.

Table 1 - Energy efficient appliances scheme

Appliance	Category	Grant of 20 % on selling price with maximum cap of
Fridge Freezer	A	€ 58.23
Washing Machine	A	€ 116.47
Dishwasher	A	€ 58.23
Tumble Dryers	A	€ 58.23
Air conditioner	A	€ 58.23

These two schemes proved to be successful not only in improving end-use energy-efficiency as shown through the calculated energy savings shown in Table 2 (MRRA, 2011) for the energy-efficient appliance grant scheme, but also as a learning tool towards the public's appreciation of the benefits of energy-efficiency in buildings.

Table 2 - Calculated energy savings obtained through the energy-efficient appliances grant scheme

Annual Calculated Savings (kWh)			
Appliance	2007	2008	2009
Fridge Freezer	374,532	391,989	18,699
Washing Machine	138,463	124,800	1,677
Dishwasher	35,596	41,272	2,684
Tumble Dryers	1,950	2,400	150
Air conditioner	562,086	690,228	11,151

In this context, statistics (MEH, 2014b) have shown that there has been a drastic change in user preference, resulting in a larger share of appliances with a better energy classification present on the national market.

Proof of this is the fact that the average sales of each category of appliances increased in the A/A+/A++ class sector as shown in Table 3.

Table 3 - Transformation in the appliance market

Level of Sales			
Appliance Category	2007	2008	2005(EU15)
Refrigeration	36	77	59
Air conditioner	16	44	N/A
Washing Machine	75	86	85
Dish Washers	85	96	80

In parallel to these schemes and aimed directly at improving the building envelope, a scheme has been in place since 2006, to promote the purchase and installation of roof insulation and double glazing in residential buildings (9). The scheme has been generally less effective with an annual uptake of around 100 units as shown in Table 4 (MRA, 2011) totalling to a total uptake 750 grants to date (NZEB2021, 2014).

Table 4 - Number of Installations aided by the building envelope grant scheme

	2008	2009	2010
Number of Installations	145	194	28

Though no official statistics exist confirming so, the reasons for such a poor uptake can be attributed to three factors:

1. Given the low heating and cooling demands associated with the Maltese Mediterranean climate, improvements in the building envelope are generally associated with a high payback period;
2. A general poor public knowledge of energy-measures associated with improving the building envelope; and

3. The perceived bothersome (and labour intensive) aspect of installing such applications.

In 2009, concurrently with the agreement of its 10 % Renewable Energy Target by 2020, the Maltese Government also devised two schemes

for the greater uptake of photovoltaic panels and solar water heaters in residential buildings. Compared to the previous grant scheme aimed at solar water heaters, these new grants were based on a more financially robust and rewarding upfront grant covering part of the capital cost, up to a maximum set capping, and in the case of photovoltaic panels, on a very lucrative Feed-in Tariff.

In the case of the photovoltaic panels the grant on the capital cost which covered up to 50 %, was augment with a guaranteed Feed-In Tariff based on the electrical throughput (units of electricity) exported to the grid. The effective Feed-In Tariff on photovoltaic produced electricity ranges from € 16c to € 25c on the basis on when the system was purchased and the type of agreement in offer at the time. These were intended to be more financially attractive than the previous schemes and proved to be successful with high subscription rates. Similar schemes were re-launched in 2013 and extended into 2014. Table 5 shows the steady increase in electricity generation from photovoltaic since 2009 (MEH, 2014b).

Table 5 - Electricity generated from photovoltaic devices

	2009	2010	2011	2012
PV Generated Electricity (MWh)	530	1,730	12,392	13,620

In the case of solar water heaters sector, as discussed previously uptake has never been exceptional with various schemes having different levels of success. Nonetheless as shown in Table 6 below (MEH, 2014b), it can be observed that the highest number of units installed annually was in reaction to the improved grant being given as a financial aid.

The solar water heaters grant incentive offered an interesting backdrop for a study which was done in 2010 by Yousif et al. In this study the social aspect was investigated as to determine the mindset of Maltese with respect to the installation of solar water heaters in dwellings.

Table 6 - Incentive schemes for the purchase of SWH

Launch Year	Rebate (% of Capital Cost)	Capping	Uptake
2005	20 %	116.48	Low
2006	40 %	232.94	1,700/yr
2009	66 %	460.00	3,500/yr
2010	40 %	560.00	N/A
2011	40 %	400.00	Ongoing

The study which was based on survey carried out amongst the villagers in Victoria and Marsalforn, two villages in Malta's sister island of Gozo, looked not only at the general perception on solar water heaters but also, and most interestingly as to what people considered as being the predominant driver in installing one such system. Among the results highlighted by the authors, the survey indicated that:

1. 88 % of the survey respondents who had a SWH were satisfied with their system's performance;
2. 71 % of those who owned a SWH had benefited from the financial government grant on capital cost;
3. 90 % of those who had no SWH, knew about the government's financial support scheme; and
4. Although 50 % of those interviewed in the survey had said that the capital incentive was a primary motivation towards buying a SWH, 58 % of those interviewed and who did not own a SWH said that they considered such a system either to be too expensive (27 %) or that they would consider buying a SWH only when necessary (31 %), such as for example, when their installed electric water heater would fail.

Apart from Government driven schemes, the private sector, mainly through a number of local banking operators in Malta also started offering lending facilities towards improving energy-efficiency. In fact a number of Malta based banks offer loan facilities and banking products to facilitate the purchase and

installation of energy-efficiency products. Table 7 lists a number of these bank products, their respective provider and a short description for each, identifying what type of energy-efficiency measure can be financed.

Although no official statistics exist in terms of the uptake of the scheme, it was established that most of these schemes have been very successful in promoting energy-efficiency in buildings.

Private sector (Bank products) financial incentives aimed at the residential sector

In terms of commercial buildings, a number of EU funded grant schemes, administered by Malta Enterprise have been targeted specifically at improving the energy-efficiency in industrial and commercial buildings. Such schemes mainly included Energy Grant Schemes offered either as financial help to set *Energy Saving Measures or Renewable Energy Sources* (Malta Enterprise, 2015).

Table 7 - Selected bank products aimed at driving energy-efficiency

Provider	Name of Product	Description of product
BOV	ECO Personal Loan	Product finances the purchase of environmentally friendly equipment such as solar water heaters, solar lamps, solar collectors, photovoltaic systems and products/systems/ services which save on electricity consumption including Class 'A' white goods, double glazing, energy audits, residential energy management systems and thermal insulation products (BOV, 2015).
APS Bank	Green Loans	Finances home owners and businesses in financing their investment in solar water heaters and PV panels (APS Bank, 2015).
Banif Bank	Banif Green	Financial product aimed at clients who wish to buy environment friendly products such as solar water heaters, roof thermal insulation, double glazing, external shading devices, photovoltaic systems, and energy efficient appliances (Banif Bank, 2015).
HSBC	HSBC Green	Finances a range of environmentally friendly initiatives and energy saving products: solar water heaters, photovoltaic installations, double glazing, solar film/room darkening, PIR (Passive Infra Red) sensors, solar lights – photo sensors, thermal insulation, external shading, and energy efficient appliances with a minimum rating of A++ (HSBC, 2015).

Grants and schemes aimed at the commercial sector

Energy Grant Schemes offered for Energy Saving Measures include all those grant scheme investments aimed at the implementation of energy saving solutions such as intelligent lighting systems, thermal insulation, building management systems, ground source cooling and energy-saving lighting. Examples include the geothermal energy system at Baxter Ltd. where the system provides 84,184kWh worth of annual electricity savings, through a system of 22 ground dug boreholes which guarantees high annual Coefficient of Performance (COP) ratings irrespective of outdoor conditions (R.E.S.I, 2012). The project was co-financed through an ERDF grant covering 50 % of the capital cost. Energy Grant Schemes offered for Renewable Energy Sources include all those grant scheme investments targeted towards the installation of energy generating solutions based on the use of renewable energy sources, mainly solar energy. Examples include:

The "Distributed CHP Generation from Small Size Concentrated Solar Power" (DIGESPO) at Arrow Pharm Ltd. an EU FP7 funded project which includes a modular micro Combined Heat and Power system comprising a small-scale concentrated solar power panels and a Stirling engine, Figure 1 (R.E.S.I, 2012). Though not fully operational, the system is already capable of producing 7MWh/year in energy savings.

Figure 1 - Part of DIGESPO plant installed at Arrow Pharma, through an EU FP7 funded project

The Solar Water Heating project at the Fortina Hotel & Spa, Figure 2 (R.E.S.I, 2012), which relies on a series of solar collectors for the production of it hot water demand. The available EU funding, made available through an ERDF fund was of 50 % the total capital cost.

Figure 2 - Solar Water Heating project at the Fortina Hotel & Spa, Sliema, Malta

Financing the energy-effciency refurbishmnet of public buildings – EU funding

Incentives aimed at public building have again been mainly through EU funded ERDF projects, specifically targeted at improving the energy-efficiency of buildings. Table 8 are excerpts taken from the Official Website of the Malta/ EU Funded projects (MEAIEM, 2015) showing a selected list of such projects.

CO_2 Reduction at Gozo General Hospital (ERDF 262 – Funding € 3,383,537)
This project involved the installation of a Combined Heat and Power system for space and water heating, a centralised heating and cooling system for space conditioning as well as a photovoltaic installation aimed at improving the energy-efficiency at the Gozo General Hospital. The objectives of this project were to reduce the hefty hospital's fossil fuel driven energy consumption levels. Besides the services provided by the hospital most of which are energy intensive, the thin fuel oil fired boiler for hot water and space heating, as well as the split units for space heating and cooling contributed significantly to the hospital's conventional energy demand. In this context, the primary objectives of this project were to:

A. Generate green energy to offset part of the electricity demand of the hospital;
B. Improve energy-efficiency for hot water and space conditioning to reduce the hospital's demand for energy generated from fossil fuels;
C. Reduce CO_2 and other pollutant emissions from hospital related activities; and
D. Contribute to the national target of 10 % share of renewable energy by 2020.

The amount of electricity generated by the project and fed to the national grid averages almost 2.1MWh annually.

CO_2 Reduction at ZAK House (ERDF 276) (Funding: € 17,495)
This project involved the installation of a new electricity and plumbing system at the Head Quarters of voluntary organisation. In detail the project included the installation of:

- A Photovoltaic system;
- Motion detectors/ time-lag switches that trigger lighting;
- Low consumption water mixers, flushing cisterns and shower heads; and
- Low consumption lighting equipment such as Compact fluorescent lamps, LED's and T-5 CFLs.

The project intended to:
- contribute to the generation of electricity through renewable clean energy sources. It is foreseen that the project will generate an average of 12,300KWh per annum over 20 years;
- make use of low consumption lighting, motion sensors/time-lag switches and low consumption water fittings, thus reducing the foreseen consumption of electricity by 3,360kWh/ year;
- reduce water consumption by 150m^3/year and saving the equivalent of 472kWh/year in desalination driven energy at the Water Services Corporation; and
- reduce the overall annual demand for electricity by 16,960kWh.

Energy-efficiency project at the Tal-Qroqq National Pool Complex (ERDF 339)
(Funding: € 488,090)
The project involved the introduction of energy efficient measures at the Tal-Qroqq National Pool complex, thus promoting resource efficiency and the reduction of the carbon-footprint. It included the installation of new heat-pump technology in conjunction with solar collector panels and an efficient VRF air-conditioning system.

Conclusion

There is a broad consensus that concrete efforts need to be done to improve the energy-efficiency of buildings, thus reducing the energy demand of the sector. Unfortunately, such efforts needs to take in consideration the hefty capital layout often required to implement such measures. In this context, many EU countries have developed specialised and dedicated financial incentives to drive the market.

Malta has followed such a market oriented model and through the use of a number of financial incentives it has tried to shape and promote such a market. Looking at what has been done, it can be concluded that after a slow start, these financial incentives have been well received by the public and commercial establishments alike, and indeed have positively shaped the market and public perception on energy efficiency.

These financial incentives have been particularly successful at for example, increasing the uptake up of photovoltaic panels on residential and commercial roofs and increasing public awareness towards energy efficient appliances and lighting. Unfortunately, possibly given the little information available, other measures such as the promotion of the installation of double-glazing and roof insulation have been less successful.

This is an area where a lot of work needs to be done, not only to make such measures more financially attractive but also at educating the public on the benefits of such measures in the context of achieving smarter buildings and regions.

In conclusion it can be said that a bottom-up approach (incentives-based approach) can be seen not only as a direct measure towards decreasing energy consumption, but also as an indirect teaching mechanism. Beyond this such a shift towards a 'state-of-the-art' energy efficient technology not only makes buildings smarter, adding value for a given cost, but also contributes to green jobs, for a more circular economy at regional level.

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